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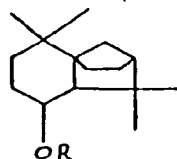
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(54) ISOLONGIFOLENE DERIVATIVES AND THEIR  
USE IN PERFUMERY COMPOSITIONS

(71) We, BUSH BOAKE ALLEN LIMITED, a British Company, of Blackhorse Lane, Walthamstow, London, E17 5QP, do hereby declare the invention, for which we pray that a Patent may be granted to us and described in and by the following statement:—

This invention relates to perfumery compositions of the type where a number of odoriferous materials of synthetic or natural origin are admixed or compounded to form a perfumery concentrate. Such concentrates may find use as such or after dilution but more usually they are added in small proportions to other materials such as to space sprays or to soap, detergents, cosmetic or deodorant compositions or to substrates such as fabric, fibres or paper products, in order to provide them with agreeable olfactory properties. Such concentrates are products of commerce and the perfumery concentrates may comprise a simple or complex mixture of individual perfumery compounds.

Thus from one aspect the invention provides compounded perfumery compositions comprising a plurality of odoriferous ingredients and one or more compounds having the formula:—



- 30 Wherein R represents a hydrogen atom or an acyl group having from one to six carbon atoms.

- 35 Such compounds may be any of the possible individual stereoisomers or mixtures of these stereoisomers. These compounds may be derived from the known terpene hydrocarbon isolongifolene and will hereinafter be referred to as isolongifolene derivatives.

It has been discovered that these compounds possess very powerful, long lasting, dry woody odours of high tenacity which are reminiscent of cedryl acetate and vetiveryl acetate. Moreover it has been found that these compounds are suited for blending with a wide range of perfumery compositions particularly those having a floral or citrus woody odour.

Mixtures of any of the aforesaid alcohols and esters are useful according to the invention. The compounds may be in any of their various epimeric forms. Particularly valuable for present use are the esters, especially the formate, acetate and propionate esters.

The novel perfumery compositions may be compounded according to recognised techniques of the perfumery art employing known odoriferous perfumery ingredients, e.g., techniques and ingredients mentioned in the standard text-books "Soap, Perfumery and Cosmetics" by W. A. Poucher, 7th edition published by Chapman and Hall (London) 1959; "Perfume and Flavour Chemicals" by S. Arctander published by the author (Montclair) 1959 and "Perfume and Flavour Materials of Natural Origin" also by S. Arctander, self-published (Elizabeth N. J.) 1960. The relevant disclosures of the aforesaid text-books are hereby incorporated by reference herein. Specific odoriferous compounds which may be blended with the isolongifolene derivatives of this invention include derivatives of 2,6 dimethyl - 2 - alkoxy - octan - 7 - ol (as claimed in our co-pending applications 52706/71 and 41845/72 now British Patent 1,414,458), vetiver oil, vetiverol, vetiveryl acetate, guaiac wood oil, guaiac wood acetate, coumarin musk ketone, lauric aldehyde, benzyl acetate, lemon oil, dimethyl benzyl carbinol, dimethyl benzyl carbinyl acetate, rose absolute, jasmine absolute, ionones, isononyl acetate, methyl phenyl acetate, styrallyl acetate,  $\beta$ -phenyl ethanol, citronellol, citronellal, geranium oil, geraniol, linalol,



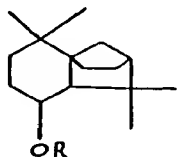
- nerol, lavandin oil, linalyl acetate, patchouli oil, petitgrain oil, bergamot oil, heliotropin, ethylene brassylate, undecyl aldehyde, cinnamaldehyde, benzyl salicylate, cinnamyl alcohol, clove bud oil, bay oil, nutmeg oil, pimento berry oil, terpineol, ylang oil, benzyl benzoate, sandalwood oil, clary sage oil, amyl salicylate, labdanum resin, methyl ionones, dihydro-myrcenol, orange oil, vanillin, ethylvanillin, olibanum resin, musk ambrette, rhodinol, mandarin oil, methyl nonyl acetaldehyde, neroli oil, cedrol, oakmoss, isovalanone, eugenol, iso-eugenol, cedarwood oil, p-tertiary butyl cyclohexyl acetate.

- 15 Particularly preferred odoriferous ingredients for blending with the isolongifolene derivatives of the invention include essential oils such as lavandin oil, patchouli oil, cedarwood oil, sandalwood oil, vetivert oil, bergamot oil, geranium oil and oakmoss oil and aromatics such as vetiverol, vetiveryl acetate, cedrol, cedryl acetate; oxidation products of isolongifolene as described in U.K. Patent 1,197,579, derivatives of 2,6 - dimethyl - 2 - alkoxyoctan - 7 - ol (as claimed in our co-
- 20 pending applications 52706/71 now British Patent 1,414,458); terpineol and musks.

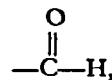
- It has been discovered that the isolongifolene derivatives of the invention have a high degree of utility in perfumery compositions both in the capacity of odoriferous ingredients and as fixatives. They can be usefully employed in a wide range of proportions, say from 0.1 to 95% by weight on the compounded perfumery compositions. In some cases it may be desired to use from 0.1, 0.5, 1.0 or 5.0 to 10, 20, 30 or 90% by weight of the isolongifolene derivative whilst in other cases from 20 to 90% e.g., 30 to 70% may be required.

- The compounded perfumery compositions of the invention find use in a wide variety of perfumed materials. They are especially useful for perfuming male toilet preparations but can equally be employed in space sprays or can be blended in soap, detergent or deodorant compositions including bath salts, shampoos, toilet waters, face creams, talcum powder, body lotions, and sun-cream preparations.
- 50 They may also be used to perfume substrates such as fibres, fabrics and paper products.

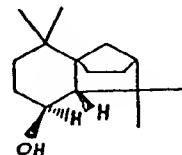
- Certain of the esters and alcohols of isolongifolene are believed to be novel chemicals and constitute a further aspect of the invention. Thus from a second aspect the invention provides compounds of the formula:



Where R is a group

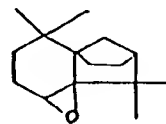


or an acetate, propionate, butyrate, isobutyrate, pantoate, (including isomers thereof) or hexoate (including isomers thereof) group or when R is a hydrogen atom and the hydroxyl group is  $\beta$  to the plane of the molecule using the conventional terpene/steroid symbolism i.e., the compound:—

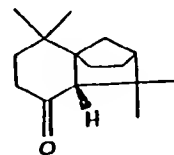


The isolongifolene derivatives for present use may be prepared from isolongifolene using standard techniques of synthetic organic chemistry.

It is reported in the Journal of Organic Chemistry Volume 135, page 1172 that treatment of this hydrocarbon with a per acid derived from a carboxylic acid and yields the epoxide:—



Treatment of this epoxide with a suitable acid as reported in Tetrahedron Volume 26, page 621 yields the ketone as the major product.



i.e., 8 - oxo - 7 $\beta$ H isolongifolene and also the isomeric compound 8 - oxo - 7 $\alpha$ H isolongifolene as a minor product.

The ketone, 8 - oxo - 7 $\beta$ H isolongifolene can be reduced to give a mixture of the two possible isomeric alcohols 8 $\alpha$  - hydroxy - 7 $\beta$ H isolongifolene and 8 $\beta$  - hydroxy - 7 $\beta$ H isolongifolene. This reduction is preferably achieved using an aluminium alkoxide in an alcohol solvent as the reducing agent but can equally be achieved using other well known reducing agents such as lithium aluminium hydride, sodium borohydride or hydrogen in the presence of a conventional catalyst e.g., as

described in the Journal of Organic Chemistry Volume 36 pages 2560.

These alcohols can then be esterified using conventional techniques to yield the esters of the invention. Esterification may be conveniently carried out by refluxing the alcohol with a stoichiometric quantity of an appropriate esterifying agent in the presence of a catalytic quantity of a strong acid.

The corresponding 7 $\alpha$ H alcohols and esters of isolongifolane may be obtained by the analogous reduction followed by esterification of 8 - oxo - 7 $\alpha$ H isolongifolane. This ketone is preferably obtained by heating the 8 - oxo - 7 $\beta$ H compound in alcoholic solution in the presence of a base to a temperature in the range 50 to 70°C or by heating this ketone to a temperature in the range 140 to 170°C.

The preparation of the novel compounds of the invention is illustrated by the following examples 1 to 5 and the perfumery compositions of the invention by examples 8 and 9. Examples 6 and 7 illustrate the preparation of intermediates in the preparation of the novel compounds.

#### EXAMPLE 1

Reduction of 8 - oxo - 7 $\alpha$ (H) - isolongifolane

Into a 2-litre reactor were placed propan - 2 - ol (500 mls.) aluminium foil (15 gms.) and a trace of iodine. The mixture was refluxed until all the aluminium had dissolved. 8 - oxo - 7 -  $\alpha$ (H) - isolongifolane (0.5 moles) was then added and the mixture refluxed. When the vapour temperature indicated the presence of acetone, it was fractionated out. After 40 hrs. the mixture was cooled and acidified (below 30°C) with dilute hydrochloric acid. The mixture was then extracted with hexane. After washing free of acid, the hexane layer was distilled to give a mixture of unreacted ketone, 8 - hydroxy - 7 $\alpha$ (H) - isolongifolane and 9 - isopropylidene - 8 - oxo - 7 -  $\alpha$ (H) - isolongifolane, the last two compounds in the ratio of 2:3.

#### EXAMPLE 2

Preparation of 8 -  $\beta$  - Acetoxy - 7 -  $\alpha$ (H) - Isolongifolane

Into a 500 mls. flask fitted with a stirrer were placed 100 gms. of 8 - hydroxy - 7 -  $\alpha$ (H) - isolongifolane, acetic acid (100 gms.), acetic anhydride (70 gms.) and sodium acetate (10 gms.). The mixture was stirred at 100°C for 7 hours and diluted with water; then extracted with petroleum spirit (60—80°) (200 mls.). The solvent was removed under reduced pressure and the ester distilled at 1.5 mm. Hg., b.pt. 126°C.

#### EXAMPLE 3

Reduction of 8 - oxo - 7 -  $\alpha$ (H) - Isolongifolane

Isopropyl alcohol (500 mls.), petroleum spirit (80—100°) and 8 - oxo - 7 - (H) -

isolongifolane were placed on a 2 litre flask and refluxed. Sodium (85 gms.) was added to the refluxing mixture over 3 hours and the mixture refluxed until all the sodium had dissolved. The reaction mixture was cooled and added to water (200 mls.) and the organic layer washed with water (2  $\times$  500 mls.). The extract was dried over sodium sulphate and the mixture was cooled to -18°C for 16 hours. The crystals of 8 -  $\beta$  - hydroxy - 7 -  $\alpha$ (H) - isolongifolane were filtered off, recrystallization from petroleum spirit (40—60°C) gave crystals m.pt. 119—124°C.

#### EXAMPLE 4

Reduction of 8 - oxo - 7 -  $\beta$ (H) - Isolongifolane

Into a stirred 20 litre reactor were placed isopropyl alcohol (9,000 mls.) aluminium foil (450 gms.) and mercuric chloride (4 gms.). The reaction mixture was refluxed until all the aluminium had dissolved. 8 - oxo - 7 -  $\beta$ (H) - isolongifolane (3,285 gms.) was added and the mixture refluxed. The acetone formed in the reaction was distilled off through a fractionating column filled with glass rings. When no further acetone could be distilled off, the reaction mixture was cooled and added to ice (7,000 gms.) and hydrochloric acid (5,000 mls.).

The alcohol was extracted with benzene (2  $\times$  2,000 mls.) and the combined benzene extracts were washed with water and dried over anhydrous sodium sulphate. The benzene was distilled off under reduced pressure and the alcohol mixture distilled at 1 mm. Hg. pressure, b.pt. 165°C to give a mixture of 8 -  $\alpha$  - hydroxy 7 -  $\beta$ (H) - isolongifolane and 8 -  $\beta$  - hydroxy - 7 -  $\beta$ (H) - isolongifolane.

#### EXAMPLE 5

Preparation of Acetate Mixture

A mixture of 8 -  $\alpha$  - hydroxy 7 -  $\beta$ (H) - isolongifolane and 8 -  $\beta$  - hydroxy - 7 -  $\beta$ (H) - isolongifolane (100 gms.), acetic acid (100 gms.), acetic anhydride (70 gms.) and sodium acetate (10 gms.) was heated to 100°C for 8 hours. The mixture was cooled, diluted with water and extracted with benzene (200 mls.). The benzene extract was washed with water and dried over anhydrous sodium sulphate. The benzene was distilled off under reduced pressure and the acetate mixture distilled at b.pt. 100°C at 0.5 mm. Hg.

#### EXAMPLE 6

8 - Oxo - 7 -  $\beta$ (H) - Isolongifolane to 8 - Oxo - 7 -  $\alpha$ (H) - Isolongifolane

8 - oxo - 7 -  $\beta$ (H) - isolongifolane (160 gm.), methanol (160 ml.) and sodium hydroxide (20 gm.) were refluxed for 16 hours. The mixture was cooled, diluted with water (300 ml.) and extracted with benzene (200 ml.). The benzene extract was washed

with water dried and the solvent distilled off under reduced pressure. The yellow oil was 85% pure 8 - oxo - 7 $\alpha$ (H) - isolongifolane by G.C. analysis.

#### EXAMPLE 7

- 5 Epimerization of 8 - oxo - 7 -  $\beta$  - (H) -  
Isolongifolane to 8 - oxo - 7 -  $\alpha$  - (H) -  
Isolongifolane  
10 8 - Oxo - 7 -  $\beta$  - (H) - isolongifolane (400  
gm.) was placed in a stirred reactor fitted  
with a column for vacuum distillation. The  
ketone was stirred and heated to 170°C; after  
18 hours no further change in the  $\alpha$  to  $\beta$   
isomer ratio was obtained and the 8 - oxo -  
15 7 -  $\alpha$  - (H) - isolongifolane was distilled off,  
b.pt. 125°C at 3 mm. Hg.

#### EXAMPLE 8

- A perfumery composition suitable for use in  
a mens cologne was made up as given be-  
low:—

|    |  |                    |
|----|--|--------------------|
| 20 | Oil of bergamot                            | 170.0              |
|    | Oil of Lemon                               | 100.0              |
|    | Oil of lime                                | 50.0               |
|    | Oil of bay                                 | 5.0                |
| 25 | Oil of lavender                            | 30.0               |
|    | Oil of patchouli                           | 10.0               |
|    | Oil of vetiver                             | 20.0               |
|    | Oil of geranium                            | 20.0               |
| 30 | Hexyl cinnamic aldehyde                    | 80.0               |
|    | Hydroxycitronellal                         | 70.0               |
|    | Methyl ionone                              | 60.0               |
|    | 2,6 dimethyl - 2 methoxy<br>octan - 7 - ol | 100.0              |
| 35 | Eugenol                                    | 20.0               |
|    | Musk ambrette                              | 30.0               |
|    | Musk ketone                                | 20.0               |
|    | Coumarin                                   | 30.0               |
|    | Myrtenal                                   | 5.0                |
| 40 | Labdanum resinoid                          | 10.0               |
|    | Olibanum resinoid                          | 20.0               |
|    | Oakmoss abs.                               | 30.0               |
|    | Jasmin abs. synthetic                      | 10.0               |
|    | Rose oil synthetic                         | 10.0               |
| 45 | Isolongifolane 8 alcohol                   | 30.0               |
|    | Isolongifolene 8 acetate                   | 70.0               |
|    |  | <hr/> 1000.0 <hr/> |

#### EXAMPLE 9

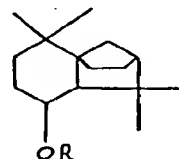
A perfumery composition suitable for use as  
a detergent perfume was made up as given  
below:—

|  |  |                    |    |
|--|--|--------------------|----|
|  | Phenyl ethyl alcohol                       | 100.0              |    |
|  | Benzyl acetate                             | 50.0               |    |
|  | Citronellol                                | 70.0               |    |
|  | Terpinyl acetate                           | 50.0               |    |
|  | Geraniol                                   | 40.0               | 55 |
|  | Linalol                                    | 50.0               |    |
|  | Geranium oil                               | 50.0               |    |
|  | Ylang oil synthetic                        | 20.0               |    |
|  | Amyl cinnamic aldehyde                     | 70.0               |    |
|  | p - tert - butyl cyclo<br>hexyl acetate    | 80.0               | 60 |
|  | Musk ambrette                              | 30.0               |    |
|  | Musk ketone                                | 20.0               |    |
|  | Coumarin                                   | 20.0               |    |
|  | Lavandin oil abrialis                      | 70.0               | 65 |
|  | Rosemary oil spanish                       | 30.0               |    |
|  | Galbanum resinoid                          | 10.0               |    |
|  | 2,6 dimethyl - 2 methoxy<br>octan - 7 - ol | 50.0               |    |
|  | Methoxycitronellal                         | 10.0               | 70 |
|  | Isolongifolene 8 alcohol                   | 30.0               |    |
|  | Isolongifolene 8 acetate                   | 50.0               |    |
|  | Cinnamic alcohol                           | 20.0               |    |
|  | Amyl salicylate                            | 80.0               |    |
|  |  | <hr/> 1000.0 <hr/> | 75 |

#### WHAT WE CLAIM IS:—

1. A compounded perfumery composition  
comprising a plurality of odoriferous ingre-  
dients and one or more derivatives of iso-  
longifolene having the formula:—

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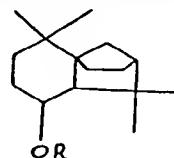
where R represents a hydrogen atom or an  
acyl group having from one to six carbon  
atoms.

2. A composition according to claim 1  
where R is a formate, acetate or propionate  
group.

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3. A composition according to either of the preceding claims wherein R is an acetate group.
4. A composition according to any of claims 1-3 which is of a floral or citrus type odour.
5. A composition according to claim 4 which further comprises one or more of the odoriferous ingredients lavandin oil, patchouli oil, cedarwood oil, sandalwood oil, vetiver oil, bergamot oil, geranium oil, oakmoss oil, vetiveryl acetate, cedrol, cedryl acetate, oxidation products of isolongifolene as described in British Patent 1,197,579, 2,6 - dimethyl - 2 - alkoxy octan - 7 - ols as described in our copending applications 52706/71 and 41845/72 now British Patent 1,414,458, terpineol and musks.
6. A composition according to any of the preceding claims wherein the isolongifolene derivatives comprise from 0.1 to 95% by weight of the said composition.
7. A composition according to claim 6 wherein the isolongifolene derivatives comprise from 1.0 to 90% by weight of the said composition.
8. A composition according to claim 7 wherein the isolongifolene derivatives comprise from 5.0 to 30% by weight of the said composition.
9. A compounded perfumery composition

substantially as described in example 8 and 9.  
10. Compounds of the formula:—

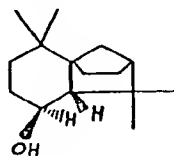


Wherein R is an acyl group having from 1 to 6 carbon atoms.

11. A compound according to claim 10 wherein R is a formate, acetate or propionate group.

12. A compound according to either of claims 10 or 11 wherein R is an acetate group.

13. A compound of the formula:—



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